231. **ITER STRUCTURAL MATERIALS EVALUATION**
$490,000
DOE Contact: F. W. Wiffen, (301) 903-4963
PNNL Contact: R. H. Jones, (509) 376-4276

Materials systems of interest to ITER for use as structural materials in the divertor, first wall, and blankets are under evaluation to select the most attractive candidates in each system, and to develop the property database on these. The PNNL program is evaluating copper alloys, stainless steels, and vanadium alloys for the ITER program. While the emphasis is on irradiation effects, especially on fracture properties, the program at PNNL also is examining hydrogen effects and compatibility with water cooling.

Keywords: Steels, Copper, Vanadium, Irradiation Effects, Compatibility

232. **DEVELOPMENT OF Nb_3Sn SUPERCONDUCTING WIRE FOR THE ITER MAGNET PROGRAM**
$5,000,000
DOE Contact: M. M. Cohen, (301) 903-4253
MIT Contact: J. Minervini, (617) 253-5503

Activities include development of Nb_3Sn superconducting wire primarily for use in the high field magnets of the ITER model coils. Aggressive target specifications for high critical current density in the 12-13 tesla magnetic field range have been set and an industrial development program has begun to produce large quantities of this wire. U.S. superconducting wire industries involved include Intermagnetics General Corp./Advanced Superconductors Inc., and Teledyne Wah Chang Albany. Characterization of critical superconducting properties and ac losses has been carried out with measurements in university and national laboratories, including establishment of standardized samples and test procedures.

Keywords: Superconductors, Magnet Materials, Nb_3Sn

233. **STRUCTURAL MATERIALS DEVELOPMENT FOR THE CONDUIT OF ITER CABLE-IN-CONDUIT-CONDUCTORS**
$1,100,000
DOE Contact: M. M. Cohen, (301) 903-4253
MIT Contact: J. Minervini, (617) 253-5503

Activities include fabrication of conduit for the conductors of the central solenoid and toroidal field model coils for ITER. The conduit material, Incoloy alloy 908, was developed via collaboration of INCO Alloys International and MIT. Work is proceeding on development of the database for this material. Alloy 908 has a low coefficient of expansion and minimizes the compressive strain in the Nb_3Sn superconductor upon cool down from the heat treatment temperature of approximately 1000 K to the operation temperature of 4 K. Industrial processing by various methods to finished conduit shape has been a priority.

Keywords: Conduit, Incoloy, Magnet Materials

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

The Small Business Innovation Research (SBIR) program is mandated by the Small Business Innovation Development Act of 1982 and the Small Business Research and Development Enhancement Act of 1992. The program is designed for implementation in a three-phase process, with Phase I determining, insofar as possible, the scientific or technical merit and feasibility of ideas proposed for investigation. The period of performance in this initial phase is about six months with awards up to $75,000. Phase II is the principal research or research and development effort and is performed in a period of up to two years with awards up to $750,000. Under Phase III, commercial applications of the research or research and development are to be pursued by small businesses with non-Federal capital or, alternatively, Phase III may involve follow-on non-SBIR Federal contracts for products or processes desired by the Government.

The materials-related projects, like all other projects in the DOE SBIR program, were selected using the specific evaluation criteria listed in the program solicitation. Award selection was based on detailed reports returned by reviewers drawn from DOE laboratories, universities, private industry, and government. In the Phase II technical evaluation process, an additional evaluation criterion addresses the commercial potential of the proposed scientific/technical work.

The work supported in this program represents high-risk research, but the potential benefits are also high if the objectives are met. Brief descriptions of all DOE SBIR projects (not just those of interest in materials research) are given in the following publications: Abstracts of Phase I Awards, 1995 (DOE/ER-0654), Abstracts of Phase II Awards, 1995 (DOE/ER-0655), and Abstracts of Phase II Awards, 1994 (DOE/ER-0628). Copies of these publications may be obtained by calling Mrs. Kay Etzler on (301) 903-5867.

MATERIALS PREPARATION, SYNTHESIS, DEPOSITION, GROWTH OR FORMING

PHASE I PROJECTS

Low Cost, Contamination-Tolerant Electrocatalysts for Low-Temperature Fuel Cells - DOE Contact Cynthia Carter, (301) 903-5997; Aspen Systems, Inc. Contact Dr. Kang P. Lee, (508) 481-5058

Laser Consolidation of Silicon Carbide/Titanium Metal Composite Turbine Rings - DOE Contact Cynthia Carter, (301) 5997; Cordec Corporation Contact Mrs. Helen Pierides, (703) 550-8044

Solid Free-Body Formed Alumina-Tungsten Electrode Insulators for Heavy Ion Fusion Accelerators - DOE Contact Mark A. Wilson, (301) 903-5048; Advanced Ceramics Research, Inc. Contact Mr. Mark Angier, (602) 792-2616

High Current Density High Temperature Superconductor Composite Conductors - DOE Contact James Daley, (202) 586-1165; American Superconductor Corporation Contact Mr. Ramesh Ratan, (508) 836-4200

Superconducting Wires for Alternating Current Magnet Applications - DOE Contact James Daley, (202) 586-1165; American Superconductor Corporation Contact Mr. Ramesh Ratan, (508) 836-4200

A Low Cost, High Temperature Superconductor Wire Manufacturing Technology - DOE Contact James Daley, (202) 586-1165; American Superconductor Corporation Contact Mr. Ramesh Ratan, (508) 836-4200

A Low Cost Receiver Plate Manfacturing Process for High Concentration Photovoltaic Systems - DOE Contact Alec Bulawka, (202) 586-5633; Amonix, Inc. Contact Mr. Vahan Garboushian, (310) 325-8091

Gallium Phosphide Ultraviolet Diode Arrays - DOE Contact Michael O'Connell, (202) 586-9311; AstroPower, Inc. Contact Mr. Thomas J. Stiner, (302) 366-0400

An Intumescent Mat Material for Joining of Ceramics to Metals at High Temperatures - DOE Contact William J. Gwilliam, (304) 285-4401; CeraMem Corporation Contact Dr. Robert L. Goldsmith, (617) 899-0467

A New Alloy for Refiner Plates in the Pulp and Paper Industry - DOE Contact Charles Sorrell, (202) 586-1514; Climax Research Services Contact Mr. James R. Lakin, (810) 489-0720

Development of Modulator Quality Rubidium Titanyl Arsenate Crystals for Remote Sensing Laser Systems - DOE Contact Michael O'Connell, (202) 586-9311; Crystal Associates, Inc. Contact Mr. G. M. Loiacono, (201) 612-0060

Slicing of Silicon Ingots with Reduced Kerf - DOE Contact Alec Bulawka, (202) 586-5633; Crystal Systems, Inc. Contact Dr. Chandra P. Khattak, (508) 745-0088

A Novel Method to Recycle Thin Film Semiconductor Materials - DOE Contact Alec Bulawka, (202) 586-5633; Drinkard Metalox, Inc. Contact Mr. Fred Gallagher, (704) 332-8173

Development of Novel Iron-Chromium-Silicon Alloys for Use in Kraft Recovery Boilers - DOE Contact Charles Sorrell, (202) 586-1514; E. R. Johnson Associates, Inc. Contact Mr. L.H. Donaldson, (703) 359-9355

High Capacity Carbon Anodes for Lithium Ion Batteries - DOE Contact Robert Marianelli, (301) 903-5808; EIC Laboratories, Inc. Contact Dr. A. C. Makrides, (617) 769-9450

Refractory Coatings for Improved Papermaking - DOE Contact Charles Sorrell, (202) 586-1514; Eltron Research, Inc. Contact Ms. Eileen E. Sammells, (303) 440-8008

An Improved Material and Low-Cost Fabrication Options for Candle Filters - DOE Contact William J. Gwilliam, (304) 285-4401; FluiDyne Engineering Corporation Contact Dr. Gary J. Hanus, (612) 544-2721

An Integrated Catalyst/Collector Structure for Regenerative Proton-Exchange Membrane Fuel Cells - DOE Contact Cynthia Carter, (301) 903-5997; Giner, Inc. Contact Dr. Anthony B. LaConti, (617) 899-7270

Pseudo-Porous Zirconium Carbide Fiber Coating for Environmentally Durable Silicon Carbide/Silicon Carbide Composites - DOE Contact Helen Kerch, (301) 903-2346; Hyper-Therm High-Temperature Composites, Inc. Contact Mr. Wayne S. Steffer, (714) 375-4085

A Resistive Fault Current Limiter Based on Highly Directional Superconductor Thick Film Conductors - DOE Contact James Daley, (202) 586-1165; Illinois Superconductor Corporation Contact Ms. Ora Smith, (708) 391-9400

A Low Cost, Windable Yttrium-Barium-Copper-Oxide Conductor by Continuous Ion Beam Assisted Deposition/ Metal Organic Chemical Vapor Deposition on a Metallic Substrate Tape - DOE Contact James Daley, (202) 586-1165; Intermagnetics General Corporation Contact Mr. Carl H. Rosner, (518) 782-1122

In-Situ Removal and Recycling of Copper Indium Selenide from Thin-Film Solar Cells - DOE Contact Alec Bulawka, (202) 586-5633; Interphases Research Contact Mr. Leslie Affonso, (805) 492-9814

Conformal Source Ion Implantation - DOE Contact Cynthia Carter, (301) 903-5997; ISM Technologies, Inc. Contact Mr. Robert J. Stinner, (619) 530-2332

Synthesis and Application of a Novel Electrode Material for Use in Proton-Exchange-Membrane Fuel Cells Capable of Using Simple Organic Fuels and Fuel Reformate - DOE Contact Cynthia Carter, (301) 903-5997; Lynntech, Inc. Contact Dr. Oliver J. Murphy, (409) 693-0017

A Novel Tritium Collection Technology Using Fullerence Tritides - DOE Contact William Weaver, (301) 903-7038; Materials And Electrochemical Research Corporation Contact Dr. R. O. Loutfy, (602) 574-1980

A Steam-Resistant Hydrogen Selective Ceramic Membrane for Fuel Cell Applications - DOE Contact Cynthia Carter, (301) 903-5997; Media And Process Technology, Inc. Contact Dr. Paul K. T. Liu, (412) 826-3711

Low-Cost Durable Tooling for High Production Rate Structural Reaction Injection Molding/Resin Transfer Molding Processing - DOE Contact Sidney Diamond, (202) 586-8032; Metal Matrix Cast Composites, Inc. Contact Dr. James A. Cornie, (617) 893-4449

Silicon Hexaboride Reinforced Aluminum Ingot Material Development for the Transportation Industry - DOE Contact Cynthia Carter, (301) 903-5997; Millennium Materials, Inc. Contact Ms. Pamela S. Clabough, (615) 691-2170

An Advanced Scintillator for Medical Imaging - DOE Contact Prem Srivastava, (301) 903-4071; Mission Support, Inc. Contact Mr. David B. Merrill, (801) 773-7900

Nanostructured Interstitial Alloys as Catalysts for Direct Energy Applications - DOE Contact Cynthia Carter, (301) 903-5997; Nanomaterials Research Corporation Contact Dr. Angelo Yializis, (602) 575-1354

Nanostructured Thermal Barrier Coatings for Natural Gas-Fired Advanced Turbines - DOE Contact William J. Gwilliam, (304) 285-4401; Nanomaterials Research Corporation Contact Dr. Angelo Yializis, (602) 575-1354

Aggressive, Abrasion-Resistant Cutters for Hard Rock Drill Bits - DOE Contact William J. Gwilliam, (304) 285-4401; Novatek Contact Mr. David R. Hall, (801) 374-6000

An Integrated Catalyst/Substrate for Catalytic Combustion - DOE Contact Cynthia Carter, (301) 903-5997; Precision Combustion, Inc. Contact Mr. J. Kevin Burns, (203) 786-5215

Cesium Iodide Bromide and Cesium Iodide Chloride Scintillators for High-Rate Applications - DOE Contact Richard Rinkenberger, (301) 903-3613; Rais Enterprises, Inc. Contact Dr. Emmanuil Raiskin, (619) 452-0500

Environmentally Responsible Recycling of Thin-Film Cadmium Telluride Modules - DOE Contact Alec Bulawka, (202) 586-5633; Solar Cells, Inc. Contact Mr. Frederick L. Yocum, (419) 534-3377

Low-Cost, Large-Area, High-Resistivity Substrates for Gas Microstrip Detectors - DOE Contact Richard Rinkenberger, (301) 903-3613; Spire Corporation Contact Mr. Richard S. Gregorio, (617) 275-6000

Bonding of Ceramic Composites for Structural Applications in Fusion Energy Systems - DOE Contact F. W. Wiffen, (301) 903-4963; Starfire Systems, Inc. Contact Dr. Walter J. Sherwood, 518-276-2112

An Energy Efficient Design for a Surface Treatment Process which Improves Wear Properties of Materials - DOE Contact Charles Sorrell, (202) 586-1514; Stirling Technologies Inc. Contact Mrs. Bobbie C. Stirling, (615) 483-0142

Fabrication of a Flexible Reacted Niobium Tin Cable for Applications in React and Wind Magnets - DOE Contact Marvin M. Cohen, (301) 903-4253; Supercon, Inc. Contact Ms. Elaine Drew, (508) 842-0174

Low Temperature Fabrication of Copper Swirl Tubes for the International Thermonuclear Experimental Reactor - DOE Contact Marvin M. Cohen, (301) 903-4253; Surmet Corporation Contact Dr. Suri A. Sastri, (617) 272-3250

Fabrication of Copper-Backed Dense Tungsten Plasma Facing Component Armor - DOE Contact Marvin M. Cohen, (301) 903-4253; Surmet Corporation Contact Dr. Suri A. Sastri, (617) 272-3250

A Novel Fabrication Process to Enable Joining of Ceramics and Intermetallics - DOE Contact William J. Gwilliam, (304) 285-4401; T/J Technologies, Inc. Contact Ms. Maria A. Thompson, (810) 347-0305

An Economic Sorbent for the Removal of Mercury, Chlorine, and Hydrogen Chloride from Coal Combustion Flue Gases - DOE Contact Sean Plasynski, (412) 892-4867; TDA Research, Inc. Contact Michael E. Karpuk, (303) 940-2301

A Discontinuous Fiber Composite Interlayer for Increased Brazed Joint Reliability - DOE Contact Marvin M. Cohen, (301) 903-4253; Technical Research Associates Contact Mr. Charles D. Baker, (801) 485-4991

Controlled Shear Strength Oxidation-Resistant Interfacial Coatings - DOE Contact Helen Kerch, (301) 903-2346; Ultramet Contact Mr. Craig N. Ward, (818) 899-0236

PHASE II PROJECTS (FIRST YEAR)

A Ceramic Material and Process for Use in Monolithic CeramicCross-Flow Filters - DOE Contact Theodore McMahon, (304) 291-4865; Blasch Precision Ceramics, Inc. Contact Mr. David W. Bobrek, (518) 372-9416

Jet Vapor Deposition of Multilayer and Nanocluster Thick Films Targets for Radioactive Nuclear Beams and Medical Applications - DOE Contact Richard Rinkenberger, (301) 903-3613; Jet Process Corporation Contact Mr. Jerome J. Schmitt, (203) 786-5130

Design and Applications of Close-Spaced Thermionic Converters with Novel Isothermal Electrodes - DOE Contact Cynthia Carter, (301) 903-5997; Space Power, Inc. Contact Mr. Joseph A. Dodson, (408) 434-9500

A Multilayer Silicon Carbide Fiber Coating for Toughened, Neutron Radiation-Resistant Silicon Carbide/Silicon Carbide Composites - DOE Contact F. W. Wiffen, (301) 903-4963; Hyper-Therm, Inc. Contact Mr. Wayne S. Steffier, (714) 375-4085

Economical and Reliable Niobium-Tin Conductors via Innovations in Stabilizers - DOE Contact T.V. George, (301) 903-4957; IGC Advanced Superconductors, Inc. Contact Mr. B. A. Zeitlin, (203) 753-5215

Carbon-Carbon to Copper Joining for Fusion Reactor Applications - DOE Contact T.V. George, (301) 903-4957; Surmet Corporation Contact Dr. Suri A. Sastri, (617) 272-3250

PHASE II PROJECTS (SECOND YEAR)

Multi Layer, Quantum Well Layer Film Thermoelectrics - DOE Contact John Warren, (301) 903-6491; Hi-Z Technology, Inc. Contact Mr. Norbert B. Elsner, (619) 535-9343

Production of Carbon Materials from Biomass - DOE Contact David Boron, (202) 586-0080; Advanced Fuel Research, Inc. Contact Dr. David G. Hamblen, (203) 528-9806

Oxide Dispersion Strengthened Silver for Use in High-Temperature Superconductor Composite Wires - DOE Contact Cynthia Carter, (301) 903-5997; American Superconductor Corporation Contact Mr. Edward P. Hamilton, (617) 923-1122

Low Temperature Deposition of Titanium Nitride - DOE Contact Cynthia Carter, (301) 903-5997; ISM Technologies, Inc. Contact Mr. Robert J. Stinner, (619) 530-2332

Coated Micrograin Carbides for Wear Resistance - DOE Contact Cynthia Carter, (301) 903-5997; Ultramet Contact Mr. Craig N. Ward, (818) 899-0236

Composite Plasma-Polymer Membranes - DOE Contact Robert Marianelli, (301) 903-5804; Bend Research, Inc.Contact Dr. Walter C. Babcock, (503) 382-4100

Improved Coated-Metal Hydrogen Extraction Membranes - DOE Contact Robert Marianelli, (301) 903-5804; REB Research and Consulting Contact Dr. Robert E. Buxbaum, (517) 332-0243

Methods of Improving Internal-Tin Niobium-Tin for Fusion Applications - DOE Contact Warren Marton, (301) 903-4965; IGC Advanced Superconductors, Inc. Contact Mr. B. A. Zeitlin, (203) 753-5215

Advanced Nondestructive Evaluation for Quality Assurance of Divertor Plate Armor Tiles in Plasma Fusion Reactors - DOE Contact Warren Marton, (301) 903-4965; Karta Technology, Inc. Contact Dr. G. P. Singh, (210) 681-9102

Dense, High Conductivity, Copper/Aluminum/Beryllium Functionally Gradient Plasma Facing Components - DOE Contact Warren Marton, (301) 903-4965; Plasma Processes Contact Ms. Cheri M. McKechnie, (205) 881-7572

Flexible Electrochromic Window Materials Based on Poly (Diphenyl Amine) and Related Conducting Polymers - DOE Contact Sam Taylor (202) 586-9214; Ashwin-Ushas Corporation, Inc. Contact Dr. P. Chandrasekar, (908) 462-1270

Advanced Window Materials Based on Conducting Polymer/Sol-Gel Ceramic Composites - DOE Contact Sam Taylor, (202) 586-9214; Gumbs Associates, Inc. Contact Dr. Ronald W. Gumbs, (908) 257-9049

An Innovative Approach for the Formation of Silicon Carbide/Silicon Carbide Composites - DOE Contact F. W. Wiffen, (301) 903-4963; Lanxide Corporation Contact Mr. Robert J. Ferris, (302) 456-6216

Doping of Chemically Vapor infiltrated Silicon Carbide to Enhance Thermal Conductivity - DOE Contact F.W. Wiffen, (301) 903-4963; Materials and Electrochemical Research Corporation Contact Dr. J. C. Withers, (574) 674-1980

MATERIALS PROPERTIES, BEHAVIOR, CHARACTERIZATION OR TESTING

PHASE I PROJECTS

Low Cost, Novel Precursors to Beta Alumina Solid Electrolyte - DOE Contact Cynthia Carter, (301) 903-5997; TDA Research, Inc. Contact Mr. Michael E. Karpuk, (303) 940-2301

A Nanolayer Coating for Dry Machining - DOE Contact Cynthia Carter, (301) 903-5997; Technology Assessment & Transfer, Inc. Contact Mrs. Sharon Fehrenbacher, (301) 261-8373

Development of a Process Management Technology for the Manufacture of High Temperature Superconductors to Improve Conductor Quality - DOE Contact James Daley, (202) 586-1165; American Superconductor Corporation Contact Mr. Ramesh Ratan, (508) 836-4200

An In-Process Quality Monitoring System for High Temperature Superconducting Wire Manufacturing - DOE Contact James Daley, (202) 586-1165; Quality Engineering Associates, Inc. Contact Dr. Ming-Kai Tse, (617) 221-0080

Low Cost, High Conductivity Plasma Facing Components - DOE Contact Marvin M. Cohen, (301) 903-4253; Fiber Materials, Inc. Contact Mr. David R. Audie, (207) 282-5911

Structure-Property Relationships of Internal-Tin Niobium Tin - DOE Contact Marvin M. Cohen, (301) 903-4253; IGC Advanced Superconductors, Inc. Contact Mr. Bruce A. Zeitlin, (203) 753-5215

Nondestructive Characterization of Radiation Embrittlement in Fusion Structural Materials Using Laser Ultrasound - DOE Contact F. W. Wiffen, (301) 903-4963; Karta Technology, Inc. Contact Dr. G.P. Singh, (210) 681-9102

Silicides for Space Power and Waste Heat Applications - DOE Contact Bill Barnett, (301) 903-3097; Hi-Z Technology, Inc. Contact Mr. Norbert B. Elsner, (619) 535-9343

Rotating, In-Plane Magnetization and Magneto-Optic Imaging of Cracks under Coatings on Ferromagnetic Metals - DOE Contact Dennis Harrison, (301) 903-2884; Physical Research, Inc. Contact Dr. William C. L. Shih, (310) 378-0056

A Modular Inspection System for Complete In-Service Examination of a Nuclear Reactor Pressure Vessel, Including the Beltline Region - DOE Contact Dennis Harrison, (301) 903-2884; Quest Integrated, Inc. Contact Ms. Diana J. Suzuki, (206) 872-9500

Development of Laser Materials and Rugged Coatings as Components for Tunable Ultraviolet Laser Systems - DOE Contact Michael O'Connell, (202) 586-9311; Lightning Optical Corporation Contact Mr. Wayne Ignatuk, (813) 938-0092

A Modified Natural Clay Sorbent for Control of Mercury from Coal Fired Combustors - DOE Contact Sean Plasynski, (412) 892-4867; Energy And Environmental Research Corporation Contact Dr. Randall Seeker, (714) 859-8851

Improved Solid Oxide Fuel Cell Seals - DOE Contact Richard Johnson, (304) 291-4564; Technology Management, Inc. Contact Mr. Benson P. Lee, (216) 541-1000

A Cost Efficient Method for Producing Ceramic Composites for Coal-Fired Furnace Applications - DOE Contact William J. Gwilliam, (304) 285-4401; Advanced Refractory Technologies, Inc. Contact Mr. Keith A. Blakely, (716) 875-4091

Application of Raman Spectroscopy to Identification and Sorting of Post-Consumer Plastics for Recycling - DOE Contact Simon Friedrich, (202) 586-6759; National Recovery Technologies, Inc. Contact Dr. Charles E. Roos, (615) 734-6400

A Sensor for Automated Plastics Sorting - DOE Contact Simon Friedrich, (202) 586-6759; Radiation Monitoring Devices, Inc. Contact Dr. Gerald Entine, (617) 926-1167

PHASE II PROJECTS (FIRST YEAR)

An Apparatus for Structural Analysis of High Temperature Materials Using Synchrotron Radiation - DOE Contact Manfred Leiser, (301) 903-3426; Containerless Research, Inc. Contact Dr. Paul C. Nordine, (708) 467-2678

A Novel High Strength Ceria-Zirconia Toughened Alumina Ceramic with Superior High Temperature Corrosion and Erosion Resistance - DOE Contact Cynthia Carter, (301) 903-5997; Selee Corporation Contact Mr. Kenneth R. Butcher, (704) 697-2411

Improvement in the Characteristics of Ternary Niobium Titanium Tantalum Alloys - DOE Contact Jerry Peters, (301) 903-5228; IGC Advanced Superconductors, Inc. Contact Mr. B. A. Zeitlin, (203) 753-5215

X-Ray Absorption Spectroscopy for Trace Analysis of Chemical Phase and Composition - DOE Contact Manfred Leiser, (301) 903-3426; Advanced Fuel Research, Inc. Contact Dr. David G. Hamblen, (203) 528-9806

High Temperature Thermally Stable Multi-Layer Quantum Well Films - DOE Contact Bill Barnett, (301) 903-3097; Hi-Z Technology, Inc. Contact Mr. Norbert B. Elsner, (619) 535-9343

A Long Life Zinc-Oxide-Titanium-Oxide Sorbent - DOE Contact Ronald Staubly, (304) 291-4991; TDA Research, Inc. Contact Mr. Michael E. Karpuk, (303) 940-2301

PHASE II PROJECTS (SECOND YEAR)

A Testing Process to Define Electrode Current Wear Mechanisms and Develop Improved Electrodes - DOE Contact Sean Plasynski, (412) 892-4867; Montec Associates, Inc. Contact Mrs. Cynthia K. Farrar, (406) 494-2596

DEVICE OR COMPONENT FABRICATION, BEHAVIOR OR TESTING

PHASE I PROJECTS

A Highly Efficient and Low Emission Catalytic Radiant Burner - DOE Contact Cynthia Carter, 301-903-5997; Selee Corporation Contact Mr. Kenneth Butcher, 704-697-2411

Light Emitting Devices Based on Germanium Quantum Crystals in a Direct Bandgap Matrix (Aluminum Nitride) - DOE Contact Cynthia Carter, (301) 903-5997; Structured Materials Industries, Inc. Contact Dr. Gary S. Tompa, 908-885-5909

A Two Dimensional Semiconductor Imaging Array for Scattered Cold Neutrons - DOE Contact Bill Oosterhuis, (301) 903-3426; Intraspec, Inc. Contact Mr. John Walter, (615) 483-1859

A Thermal Neutron Detector Based upon a Lanthanum Boron Germanate Scintillator - DOE Contact Bill Oosterhuis, (301) 903-3426; Mission Support, Inc. Contact Mr. David B. Merrill, (801) 773-7900

Advanced Silicon Carbide and Beryllium/Aluminum Alloy Integrally Cooled X-ray Synchrotron Mirrors - DOE Contact Bill Oosterhuis, (301) 903-3426; SSG, Inc. Contact Mr. Dexter Wang, (617) 890-0204

A New Type of Acoustical Sensor for Chemical Measurements - DOE Contact Robert Marianelli, (301) 903-5808; Analysis Consultants Contact Dr. B. G. Martin, (714) 830-1033

Chemically Resistant Gas Separation Perfluoromembranes - DOE Contact Robert Marianelli, (301) 903-5808; Compact Membrane Systems, Inc. Contact Dr. Stuart Nemser, (610) 499-8860

Advanced Chemiresistor Devices as Micron Size Sensors for the Rapid, On-Line Measurement of Chemical Vapors - DOE Contact Robert Marianelli, (301) 903-5808; Microsensor Systems, Inc. Contact Dr. Hank Wohltjen, (502) 745-0099

Interactive Particle Detector Teaching Aids Based on Plastic Scintillators - DOE Contact David Sutter, (301) 903-5228; Quantum Research Services, Inc. Contact Dr. William L. Dunn, (919) 544-4952

A Thermally Stable Iron Core Permanent Magnet Dipole Utilizing a Flux Shunt - DOE Contact Jerry Peters, (301) 903-5228; Field Effects, Inc. Contact Mr. Carl H. Rosner, (518) 782-1122

Enhanced Flux Pinning at High Fields in Niobium-Titanium-Tantalum by Magnetic Artificial Pinning Centers - DOE Contact Jerry Peters, (301) 903-5228; IGC Advanced Superconductors, Inc. Contact Mr. Bruce A. Zeitlin, (203) 753-5215

Development of Artificial Pinning Center Niobium-Titanium Superconductors with Very High Residual Resistivity Ratio Aluminum Stabilizers - DOE Contact Jerry Peters, (301) 903-5228; Supercon, Inc. Contact Ms. Elaine Drew, (508) 842-0174

A High Resolution Multi-hit Time to Digital Converter Integrated Circuit - DOE Contact Robert Woods, (301) 903-3367; Lecroy Corporation Contact Mr. Joseph Migliozzi, 914-578-6006

A Segmented Deep Depletion Depth Silicon Detector and Application Specific Integrated Circuits Signal Conditioning Systems for Physics Research - DOE Contact Richard Rinkenberger, (301) 903-3613; Intraspec, Inc. Contact Mr. John Walter, (615) 483-1859

Microporous Alumina Microchannel Plates - DOE Contact Richard Rinkenberger, (301) 903-3613; Nanosystems Inc. Contact Mr. Robert Boerstler, (203) 354-3668

Manufacturing Technologies, Improved Performance, and Cost Reduction of Superconducting Radiofrequency Resonant Niobium Cavities - DOE Contact Richard Rinkenberger, (301) 903-3613; Atlas Technologies, Inc. Contact Mr. Richard D. Bothell, (360) 385-3123

A High Brightness Cold Cathode Electron Beam Source - DOE Contact Richard Rinkenberger, (301) 903-3613; NZ Applied Technologies, Inc. Contact Dr. Peter E. Norris, (617) 935-2030

A High Conductance Thermal Interface - DOE Contact Marvin M. Cohen, (301) 903-4253; Energy Science Laboratories, Inc. Contact Dr. Timothy R. Knowles, (619) 552-2034

A Helium-Cooled Faraday Shield Using Porous Metal Cooling - DOE Contact T. V. George, (301) 903-4957; Thermacore, Inc. Contact Mr. Donald M. Ernst, (717) 569-6551

Low Cost Fabrication of Large Silicon Carbide/Silicon Carbide Composite Structures - DOE Contact F. W. Wiffen, (301) 903-4963; Lanxide Corporation Contact Dr. Christopher Kennedy, 302-456-6320

Accurate Broadband Detectors for Plasma Diagnostics - DOE Contact Charles Finfgeld, (301) 903-3423; Boulder Metric Contact Ms. Alice O. McDonald, (303) 494-9680

Bandgap-Engineered Thermophotovoltaic Devices for High Efficiency Radioisotope Power - DOE Contact Bill Barnett, (301) 903-3097; Edtek, Inc. Contact Mr. W. E. Horne, (206) 395-8084

Ion-Selective Ceramic Membranes for Separation of Radioactive Wastes - DOE Contact Joseph Paladino, (301) 903-7449; Materials And Systems Research, Inc. Contact Dr. Anil V. Virkar, (801) 466-1262

Removal and Concentration of Heavy Metals and Radionuclides from Polluted Groundwater - DOE Contact Kristine Bilenki, (301) 903-1687; Membrane Technology And Research, Inc. Contact Ms. E. G. Weiss, (415) 328-2228

Rugged, Tunable Infrared Laser Sources - DOE Contact Michael O'Connell, (202) 586-9311; Deacon Research Contact Dr. Olive Lee, (415) 493-6100

A Mid-Infrared Laser for Remote Sensing of Chemicals - DOE Contact Michael O'Connell, (202) 586-9311; INRAD, Inc. Contact Ms.Maria Murray, (201) 767-1910

A Membrane-Based Process for the Removal of Nitrogen from Natural Gas - DOE Contact William J. Gwilliam, (304) 285-4401; Bend Research, Inc. Contact Mr. Kelly L. Smith, (503) 382-4100

Electrochemical Activation of Natural Gas Constituents to Alcohols Using Bimetallic Anode Electrocatalysts - DOE Contact William J. Gwilliam, (304) 285-4401; Eltron Research, Inc. Contact Ms. Eileen E. Sammels, (303) 440-8008

An Innovative Membrane and Process for Removal and Recovery of Natural Gas Liquids - DOE Contact William J. Gwilliam, (304) 285-4401; Membrane Technology and Research, Inc. Contact Ms. E. G. Weiss, (415) 328-2228

A Tubular Intermediate Temperature Natural Gas Fuel Cell Incorporating a Perovskite Solid Electrolyte - DOE Contact William J. Gwilliam, (304) 285-4401; Eltron Research, Inc. Contact Ms. Eileen E. Sammells, (303) 440-8008

A Lower Cost Molten Carbonate Matrix - DOE Contact William J. Gwilliam, (304) 285-4401; M-C Power Corporation Contact Mr. Patrick F. McSweeney, (708) 986-8040

Fabrication of Multi-layer Molten Carbonate Fuel Cell Composites - DOE Contact William J. Gwilliam, (304) 285-4401; M-C Power Corporation Contact Mr. Patrick F. McSweeney, (708) 986-8040

Low Cost Molten Carbonate Fuel Cell Anodes - DOE Contact William J. Gwilliam, (304) 285-4401; M-C Power Corporation Contact Mr. Patrick F. Sweeney, (708) 986-8040

Abrasive-Waterjet Machining Techniques for Ceramic-Material Coal-Based Power System Components - DOE Contact William J. Gwilliam, (304) 285-4401; Quest Integrated, Inc. Contact Ms. Diana J. Suzuki, (206) 872-9500

Advanced Hot Gas Filter Development - DOE Contact William J. Gwilliam, (304) 285-4401; Ultramet Contact Mr. Craig N. Ward, (818) 899-0236

PHASE II PROJECTS (FIRST YEAR)

Economical Photochromic Films Based on Metal Oxides - DOE Contact Cynthia Carter, (301) 903-5997; EIC Laboratories, Inc. Contact Dr. A. C. Makrides, (617) 769-9450

A Continuous Cryopump/Pellet-Fabrication Apparatus for Fusion - DOE Contact T.V. George, (301) 903-4957; Cryogenic Applications F, Inc. Contact Dr. Christopher A. Foster, (615) 435-5433

Development of Expansive Cements Using Dry Flue Gas Desulfurization Solid Wastes - DOE Contact Mary Ashbaugh, (304) 291-4966; Praxis Engineers, Inc. Contact Ms. Suzanne C. Shea, (408) 945-4282

Highly Selective Membranes for the Separation of Organic Vapors Using Super-Glassy Polymers - DOE Contact Robert Marianelli, (301) 903-5804; Membrane Technology and Research, Inc. Contact Ms. E. G. Weiss, (415) 328-2228

A Long Life Perovskite Oxygen Electrode for Calcium and Lithium Oxide Processing in Nuclear Fuel Cycles - DOE Contact Eli Goodman, (301) 903-2966; Eltron Research, Inc. Contact Ms. Eileen E. Sammells, (303) 440-8008

Fullerene Based Catalysts for Heavy Oil Upgrading - DOE Contact Udaya Rao, (412) 892-4743; TDA Research, Inc. Contact Mr. Michael E. Karpuk, (303) 940-2301

A Low Emission Alkali Metal Thermal to Electric Converter Automotive Power System - DOE Contact Robert Astheimer, (301) 903-4410; Advanced Modular Power Systems, Inc. Contact Dr. Thomas K. Hunt, (313) 677-4260

An Acoustic Plate Mode Sensor for Aqueous Mercury - DOE Contact Paul Hart, (301) 903-7456; BIODE, Inc. Contact Dr. Douglas McAllister, (207) 883-1492

PHASE II PROJECTS (SECOND YEAR)

Glass-Ceramic Construction Tiles from Coal-Fired Boiler Flyash - DOE Contact Mary B. Ashbaugh, (304) 291-4966; Vortec Corporation Contact Dr, James G. Hnat, (215) 489-2255

A High Repetition-Rate High Power, All-Solid-State Pulsed Driver for Electrodeless Inductive Thrusters - DOE Contact John Warren, (301) 903-6491; Science Research Laboratory, Inc. Contact Dr. Jonah Jacob, (617) 547-1122

Demonstration of an Integrated Carbon Dioxide/Thermal Management System for Carbonate Fuel Cells - DOE Contact Clifford Carpenter, (304) 291-4041; Energy Research Corporation Contact Dr. Hans Maru, (203) 792-1460

Porous Aluminum Nitride Part Fabrication to Support Advanced Battery Development - DOE Contact Cynthia Carter, (301) 903-5997; Advanced Refractory Technologies, Inc. Contact Mr. Keith A. Blakely, (716) 875-4091

Capacitive Energy Storage Using High Surface Area Transition Metal Compounds - DOE Contact Cynthia Carter, (301) 903-5997; Chemat Technology, Inc. Contact Ms. Xin Qin, (818) 727-9786

Advanced Ceramic Fibers for a Carbonate Fuel Cell Matrix - DOE Contact Bruce Harrington, (304) 291-5427; Energy Research Corporation Contact Dr. Hans Maru, (203) 792-1460

An In-Situ Particle Sensor for Metal Forming Processes - DOE Contact Manfred Leiser, (301) 903-3426; Advanced Fuel Research, Inc. Contact Dr. David G. Hamblen, (203) 528-9806

Development of a High Spatial Resolution Neutron Detector - DOE Contact Manfred Leiser, (301) 903-3426; BioTraces, Inc. Contact Dr. A. K. Drukier, (301) 864-0816

A High Resolution Scintillator-Based Neutron Detector - DOE Contact Manfred Leiser, (301) 903-3426; Nanoptics, Inc. Contact Dr. Dr. James K. Walker, (904) 378-6620

On-Chip Infrared-Spectral Sensors by Superconducting Detector Arrays - DOE Contact Robert Marianelli, (301) 903-5804; Advanced Fuel Research, Inc. Contact Dr. David G. Hamblen, (203) 528-9806

Radiation Resistant Radio Frequency Feedthrough Insulators for Fusion Applications - DOE Contact Warren Marton, (301) 903-4965; Composite Technology Development, Inc. Contact Dr. Naseem A. Munshi, (303) 447-2226

Helium-Cooled Divertors with Low-Activation Materials and Simple Fabrication Techniques - DOE Contact Warren Marton, (301) 903-4965; Creare, Inc. Contact Mr. Robert A. Hicken, (603) 643-3800

Niobium-Tin Superconducting Wire with a Built-in Niobium Surface Coating to Limit Inter-Strand Eddy Currents in Cables - DOE Contact Warren Marton, (301) 903-4965; Supercon, Inc. Contact Ms. Elaine Drew, (508) 842-0174

Ceramic Filters for Ultrafine Particulate Separation in Combustion Gas Environments - DOE Contact Richard Tischer, (412) 892-4891; Materials and Electrochemical Research Corporation Contact Dr. J. C. Withers, (602) 574-1980

A Carbonate Fuel Call Monolith for Low-Cost and High Power Density Operation - DOE Contact Venkat Venkataraman, (304) 291-4105; Energy Research Corporation Contact Dr. Hans Maru, (203) 792-1460

SMALL BUSINESS TECHNOLOGY TRANSFER PROGRAM

The Small Business Technology Transfer (STTR) program, now completing its first year, was established as a three-year pilot program in compliance with the Small Business Research and Development Enhancement Act of 1992, Public Law 102-564. Grant applications are solicited from small science- and technology-based U.S. firms (with 500 employees or less) in collaboration with a non-profit research institution (e.g. National laboratories and universities). Awards are made competitively to the small

business with the collaborating research institution serving as a subcontractor. STTR supports innovative R&D and encourages conversion of that R&D into commercial applications of economic benefit to the Nation. The STTR program is designed for implementation in three phases, with Phase I determining, insofar as possible, the scientific or technical merit and feasibility of ideas proposed for investigation. The period of performance in this initial phase is about nine months, and awards are limited to $100,000. Phase II is the principal research or R&D effort, and only Phase I awardees can compete for Phase II awards of up to $500,000 for work to be performed in a period of up to two years. In Phase III, commercial application of the research or R&D is pursued using non-Federal funding or, alternatively, it may involve follow-on non-STTR Federal contracts for products or services desired by the Government.

The materials-related projects, like all other projects in the STTR program and the SBIR program, were selected on the basis of scientific and technical merit, as judged against the specific criteria listed in the solicitation. Award selections were based on reviews performed by personnel in DOE laboratories, universities, private industry, and government.

As in the SBIR program, these projects represent high-risk research, but the potential benefits are also high if the objectives are met. Brief descriptions of all DOE STTR projects, not only those of interest in materials research, are given in Abstracts of Phase I Awards 1995 (DOE/ER-0652).

MATERIALS PREPARATION, SYNTHESIS, DEPOSITION, GROWTH OR FORMING

PHASE I PROJECTS

Laser Processing of Thermal Sprayed Beryllium Plasma Facing Components - DOE Contact T. V. George, (301) 903-4957; Plasma Processes, Inc. Contact Mr. Tim McKechnie, (205) 851-7653

Amorphous Silicon/Crystalline Silicon Heterojunctions for Nuclear Radiation Detector Applications - DOE Contact Richard Rinkenberger, (301) 903-3613; Quantrad Sensor, Inc. Contact Dr. Nicholas J. Szluk, (408) 727-7827

An Investigation to Determine the Commercial Feasibility of Vanadium-Hafnium-Zirconium Laves Phase C-15 Superconductor - DOE Contact Jerry Peters, (301) 903-5228; Supercon, Inc. Contact Ms. Elaine Drew, (508) 842-0174

Production of Jelly-Roll Process Niobium-Aluminum Superconducting Wire Using Low Oxygen Niobium Foils and Special Softening Techniques During Deformation - DOE Contact Jerry Peters, (301) 903-5228; Supercon, Inc. Contact Ms. Elaine Drew, (508) 842-0174

Catalysts for Heterogeneous Alkene Hydroformylation - DOE Contact William Millman, (906) 227-1059; TDA Research, Inc. Contact Mr. John D. Wright, (303) 422-7819

Low Loss Sapphire Windows for High Power Microwave Transmission - DOE Contact T. V. George, (301) 903-4957; Thoughtventions Unlimited Contact Dr. Stephen C. Bates, (203) 657-9014

DEVICE OR COMPONENT FABRICATION, BEHAVIOR OR TESTING

PHASE I PROJECTS

An Advanced X-ray Detector and Detector Array - DOE Contact Richard Rinkenberger, (301) 903-3613; Astralux, Inc. Contact Dr. Ethel Pankove, (303) 494-0670

Environmentally Benign Manufacturing of Compact Disk Stampers - DOE Contact Helen Kerch, (301) 903-2346; Prism Company Contact Mr. Peter Ciriello, (508) 785-2511

Improved Strained-Layer Photocathodes for Spin-Polarized Electrons - DOE Contact Jerry Peters, (301) 903-5228; Spire Corporation Contact Mr. Richard S. Gregorio, (617) 275-6000